

## Description

# High definition multimedia interface connector

### BACKGROUND OF INVENTION

[0001] *1. Field of the Invention*

[0002] The present invention relates to a high definition multi-media interface (HDMI) connector, and more specifically to a small connector utilized in digital TV, DVD player, deck-top box (video signal converter), and other digital Audio/Video (AV) product.

[0003] *2. Description of the Related Art*

[0004] LCD in nowadays has become a most popular output device for Audio/Video (AV) product. Since it plays an important role in the products of modern PC monitor and TV display, and in the light of connector for digital signal transmission has become a mainstream product in LCD industries, the HDMI connector of the invention is thus created to serve this purpose. The HDMI (High Definition

Multimedia Interface) is a transmission interface utilized for the transmission of a high definition multimedia digital signal including high fidelity image and multi-channel audio signal. The earliest specification of the HDMI was established by several Audio/Video industries, such as HITACHI, Panasonic, Philips, Sony, Silicon Image, Thomson and Toshiba. It established the most frequently used standard specification based on DVI (Digital Visual Interface) for digital image signal transmission. The object of the invention is to transmit a digital screen signal between PC and LCD and display a live scene on LCD with high fidelity. Furthermore, the digital image signal transmitted by DVI also provides the effect of unauthorized copy proof, and its signal may be encoded at the transmitting end and decoded at receiving end that will provide the effect of preventing unauthorized reproduction of the image signal being transmitted. Although DVI improved the resolution and quality of picture on a LCD screen, however, DVI is not absolutely perfect, because it didn't take the transmission of digital audio signal into account so far, therefore users need to connect additional line or use traditional AV terminal for signal transmission. This may not raise the question of compatibility among the signal

transmissions in the application of personal computer, but it does cause chaos when used in the family theater set which is getting more and more popular among the consumers. Furthermore, as the digital products such as digital video camera and digital electronic camera are prevailed, it may become bothersome that if LCD TV requires a plurality connection lines. This may also increase the number of installation components for family theater set, and further increase the price of product. Therefore, the HDMI of the present invention is thus created for family theater set to eliminate the flaws of DVI mentioned above. The HDMI of the present invention is not only in compliance with the standard specification of DVI but also take digital audio signal into account in the design of HDMI connector, which is not only fully compatible with DVI but also capable of transmitting uncompressed data of digital AV signal without distortion. Furthermore, the HDMI also has advantages, such as, it complies with all kinds of video format specification used in the market, thus, it is capable of communicating with all kinds of product by all kinds of video transmission formats. Therefore, the HDMI provides the best quality and high fidelity video signal for consumer AV products, and because it supports all kinds

of transmission format of digital video signal, resulted in less cable and smaller connector for the transmission of uncompressed data. Furthermore, the HDMI also succeeded the feature of unauthorized copy proof of DVI. It will alleviate the burden of movie filmmakers worrying that the export of the highest quality video products will come across with unauthorized reproduction by piracy. The HDMI connector also provides two-way communication for digital TV, DVD player, deck top box (signal converter) and other small connectors of digital AV products. The advantage is that the player provides the best image quality through determining which format is suitable for the received signal automatically. The HDMI connector is more convenient to install inside different AV products, because it is designed to reduce the volume of interface connector significantly. It is known from the mentioned above that the HDMI will be a mainstream connector for AV product in the future. The HDMI will be the first AV standard specification supported throughout the software supplier, system provider and CE (Consumer Electronics) makers in a chain link. Therefore, the HDMI connector needs to be built with a strong construction to comply with the demand of high-speed transmission. The object

of the invention is to provide such new type of connector construction for the newly developed system.

[0005]

## SUMMARY OF INVENTION

- [0006] The main object of the present invention is to provide a connector for high definition multimedia digital transmission interface. It utilizes a cable connecting means to firstly place the cable in the inner guide slot of the wiring block. The cable will be fixed in a secured array and convenient for soldering automatically.
- [0007] Another object of the invention is to provide a high definition multimedia interface connector, wherein the protrusion and the latch hole were prefabricated respectively on the front and the rear metallic housing assembly for a prompt latch action for the front and the rear shell while receiving the insulated housing assembly therein.
- [0008] Further object of the invention is to provide a high definition multimedia interface connector with the plastic outer shell and front cover to accommodate the front and rear shells through a multiple locking mechanism by means of engagement of buckles and notches to enable a prompt latch action for the plastic outer shell and the front cover.

- [0009] To achieve above objects, the HDMI connector in accordance with the present invention comprises an insulated housing assembly, a metallic housing assembly, and a plastic outer shell, wherein the insulated housing assembly further consists of the insertion portion and the wiring block.
- [0010] When the terminal is inserted in the insertion portion, both are latched and secured by means of a multiple locking mechanism. After the integration of the insulated housing assembly is completed, the insertion portion of the insulated housing assembly is inserted into the metallic front shell, the metallic front shell and the insulated housing assembly are further integrated by means of engagement of the latch slot at the rear end of the metallic front shell and the latch lug on the insertion portion of the insulated housing assembly, followed by incorporating the integrated assembly with the metallic rear shell by means of engagement of the protrusion on the metallic front shell and the latch hole on the metallic rear shell to form a compact assembly.
- [0011] When the insulated housing assembly and the metallic rear shell are in place, the inward projection at the two sides of the metallic rear shell thrusting against the flange

of the metallic front shell to avoid the metallic housing assembly being loose thereof.

- [0012] Finally, the metallic shell assembly is engaged in the plastic outer shell, and the front cover is attached around the front part of the connector, wherein the metallic shell assembly is fixed in the plastic outer shell by means of engagement of the buckles on the front cover and the notches at the front end of the plastic outer shell, and the assembly of the HDMI connector is completed.
- [0013] The present invention will be readily apparent to those skilled in the art upon reading the following description of a preferred embodiment of the present invention and upon reference to the accompanying drawings.
- [0014]

#### **BRIEF DESCRIPTION OF DRAWINGS**

- [0015] FIG. 1 is an exploded view of a HDMI connector in accordance with the present invention; FIG. 2 is an exploded view on the reverse side of a HDMI connector in accordance with the present invention; FIG. 3 is an assembled view of FIG. 1 at the first stage; FIG. 4 is an assembled view of FIG. 1 at the second stage, and FIG. 5 is an assembled view of FIG. 1 at the final stage.

## DETAILED DESCRIPTION

[0017] With reference to FIG.1 and FIG.2, wherein a HDMI connector 1 comprises an insulated housing assembly 10, a metallic housing assembly 20, a plastic outer shell 30, and a front cover 40. The insulated housing assembly 10 consists of the insertion portion 11 and wiring block 12, and the insertion portion 11 is an insertion place for the terminal 5. The structure of the insertion portion 11 consists of the insertion front 13 at front part and the retainer 14 at rear part. The insertion front 13 is a flat projecting body, which provides two terminal receptacle slots 131 aligned at its top and bottom sides extended throughout the portion from the insertion front 13 at the front part to the retainer 14 at the rear part, and utilizing the curved contour shape at the bottom of both sides of the projecting body to form an accuracy error proof retainer. The retainer 14 jointly constitutes a rectangular body through connection with the insertion front 13. A plurality of latch lug 141 embedded on the top and bottom end are engaged with the latch slot 211 furnished on the metallic front shell 21, the positioning poles 142 are furnished at

the end of the rectangular body, and a parallel stop plate 15 having a hollowed stop slot 151 is extended at the both sides of the rectangular body. The wiring block 12 is a T shape body oriented in horizontal direction having a plurality of guide slots 122 on the side surface of the perpendicular block 121. The number and the position of the guide slots 122 are in correspondence with the terminal receptacle slots 131 mentioned above. A positioning slot 124 is arranged at the bottom of the flat block 123 in front of the T shape body, wherein the positioning slot 124 and the positioning pole 142 on the topside of the rectangular body are engaged each other, while the latch points 125 furnished on the both sides of the T shape body are thus designed to latch with the hollowed stop slots 151 erected on the stop plate 15 of the rectangular body. The metallic housing assembly 20 consists of the front and rear portions and the configuration of the metallic front shell 21 are similar to the insertion portion 11 of the insulated housing assembly 10 in order to accommodate the insertion portion 11 therein. A plurality of latch slots 211 and protrusions 212 are furnished on the long side surface of the rectangular body of the metallic front shell 21, wherein the latch slots 211 are engaged

with the latch lugs 141 of the retainer 14 of the insulated housing assembly 10 mentioned above, and the protrusions 212 are engaged with the latch holes 221 on the metallic rear shell 22. The metallic rear shell 22 is a rectangular body having a hollow front portion and a hollow cylinder at rear part with a sufficient space to receive the cablings. The latch holes 221 are furnished at the front end of both top and bottom wide surface, the positions of the latch holes 221 and the protrusions 212 on the metallic front shell 21 are correspondingly matched. And a slanting inward projection 222 is furnished at a feasible position of both sides of the narrow surface to retain the rectangular end side of the received metallic front shell 21. This will prevent the front and metallic rear shell 21,22 from further longitudinal displacement for loose inner space of the metallic rear shell 22 during integration operation thereof. The plastic outer shell 30 is adapted to receive the metallic rear shell 22 containing the metallic front shell 21 for firmly covering the both. There also constitutes a plurality of cavities 31 on the front end of the top and bottom sides of the plastic outer shell 30, and the number and position of the cavities 31 and the buckle 41 on the front cover 40 are correspondingly matched. The

front cover 40 has an opening similar to the insertion portion 11 and metallic front shell 21, so it may confine the front part of the metallic front shell 21 and retain the metallic front shell 21 at the rectangular part of the metallic front shell 21, and the buckle 41 is furnished on the top and bottom sides of the frame of the front cover 40. The terminal 5 is a typical component frequently used, therefore, it will not be described recurrently hereinafter. The assembly process of the preferred embodiment of the present invention is carried out from inside out. The first step of assembly is inserting the cable wires into the plastic outer shell 30 and rear metallic end shell 22, followed by inserting the terminal 5 firstly into the terminal position slot 131 inside the insertion portion 11 of the insulated housing assembly 10, and then the wiring block 12 is aligned with the insertion portion 11 at the rear half part of the retainer 14 and inserted therein, in turn, the position slot 124 on the horizontal block 123 of the wiring block 12 matches with the positioning pole 142 on the rectangular part of the retainer 14. As a result, the top and bottom sides of the horizontal block 123 are inserted inside the terminal 5 against the top and bottom rows of the same respectively, and the latch points 125 on both T

shape side surfaces of wiring block 12 are also latched with the hollowed stop slots 151 on the stop plate 15 of the retainer 14. The insertion portion 11 of the insulated housing assembly 10 and the rear wiring block 12 may thus obtain a stable fixation through multiple positioning and locking mechanisms securing the terminal within. Then, the cable wires to be welded with terminal 5 is placed in the guide slot 122 on the wiring block 12, the cable wires and terminal 5 are connected by welding the cable wires onto the terminal 5. The first assembly step is thus completed as shown in the Fig. 3. The second step of assembly is firstly integrating the metallic front shell 21 with the part assembled in the first step, and the latch slot 211 on the rectangular part of the metallic front shell 21 incorporates with the latch lugs 141 of the retainer 14 of the insulated housing assembly 10, thus the metallic front shell 21 is integrated with the assembled part, followed by inserting integrated part into the metallic rear shell 22 with the cable wires passing through. The protrusions 212 on the rectangular part of the metallic front shell 21 are latched with latch holes 221 on the metallic rear shell 22, therefore, the metallic front and rear shell 21, 22 are prevented from further vertical displacement by means of the

slanting inward projection 222 on both sides of the metallic rear shell 22 thrusting against the side edge of the rectangular part of the accommodated metallic front shell 21. The second step of assembly is thus completed as shown in FIG.4. The third step of assembly is to attach the front cover 40 around the previously assembled metallic front shell 21 of the metallic housing assembly 20 to retain the rectangular part of the metallic front shell 21, and move the assembled part into the plastic outer shell 30 with the cable wires passing through. Finally, the whole assembly of metallic housing assembly 20 is fixed firmly in the plastic outer shell 30 by means of engagement of the buckle 41 on the front cover 40 latched with the notch 31 on the plastic outer shell 30, and the complete assembly of the connector is accomplished as shown in Fig. 5. From the above description it is understood that the HDMI connector of the present invention is thus fabricated and assembled through a multiple locking mechanism to form a rigid and compact structure in compliance with the strict requirements. Although the present invention has been described with reference to a preferred embodiment thereof, it is apparent to those skilled in the art that there are a variety of modifications and changes that

may be made without departing from the scope of the present invention which is intended to be defined by the appended claims.

[0018]